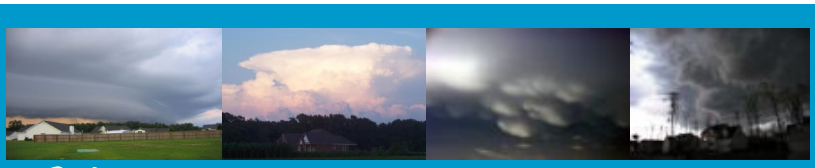


Changing Skies Over Central North Carolina

VOLUME II, ISSUE 2 SUMMER 2014
NOAA'S NATIONAL WEATHER SERVICE RALEIGH, NC

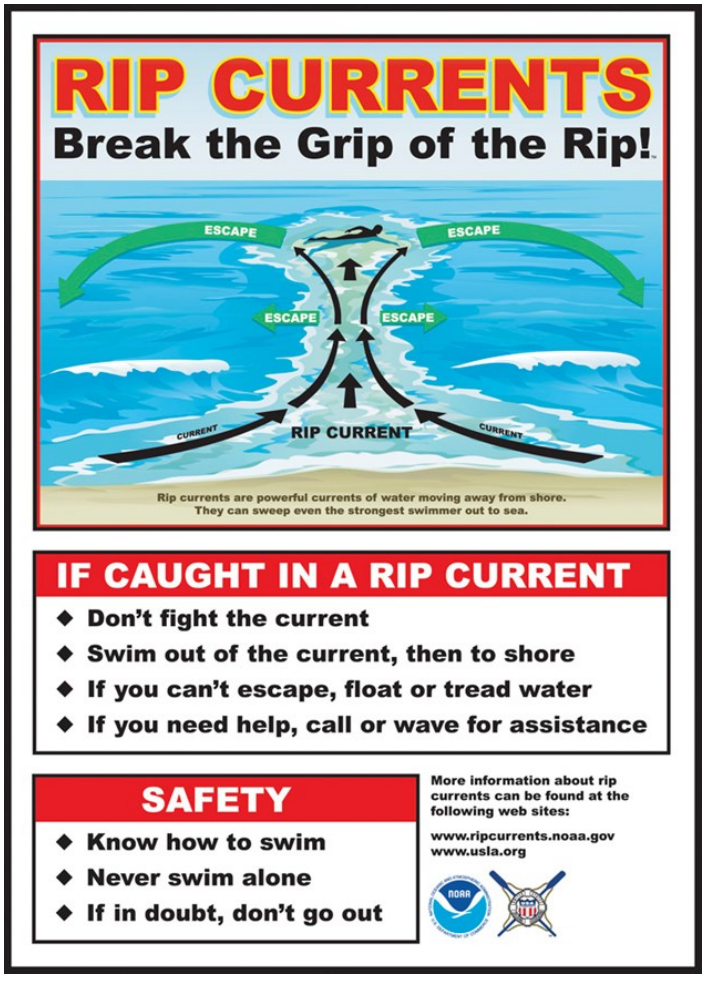
INSIDE THIS ISSUE:

Know Before You Go: Rip Currents

Every year thousands of central North Carolinians flock to beaches from southern Virginia to South Carolina and beyond. North Carolina boasts some of the longest coastline and most pristine beaches on the East Coast. In fact, North Carolina is second only to Florida when it comes to Atlantic Ocean coastline length with 301 miles of oceanfront property. With average summertime temperatures near 90 degrees, it's no wonder North Carolinians flock to the ocean to cool off. It is important to remember, however, that swimming in the ocean is a completely different animal than taking a swim at Jordan Lake or in your neighborhood pool. Ever changing winds, currents, and ocean floor bathymetry can create a recipe for dangerous rip currents, easily capable of overcoming a strong swimmer, no less a novice. There are ways to identify rip currents from the shore to avoid getting in them in the first place, but if you do find yourself caught in a rip, there are also many ways to escape and return safely to shore.

From the shore, one can identify rip currents a couple of different ways. The first is by looking for sea foam that extends out to sea as in the picture on page 6. Secondly, a rip current can sometimes be spotted in between two wave breaks in a seemingly calm area. The area appears calm because water from both waves on the right and the left are moving back out to sea. Sometimes, however, the rip can be hidden by other wave activity and is not always easy to spot from the beach, especially in the case of an approaching storm offshore, when waters may be rougher than normal.

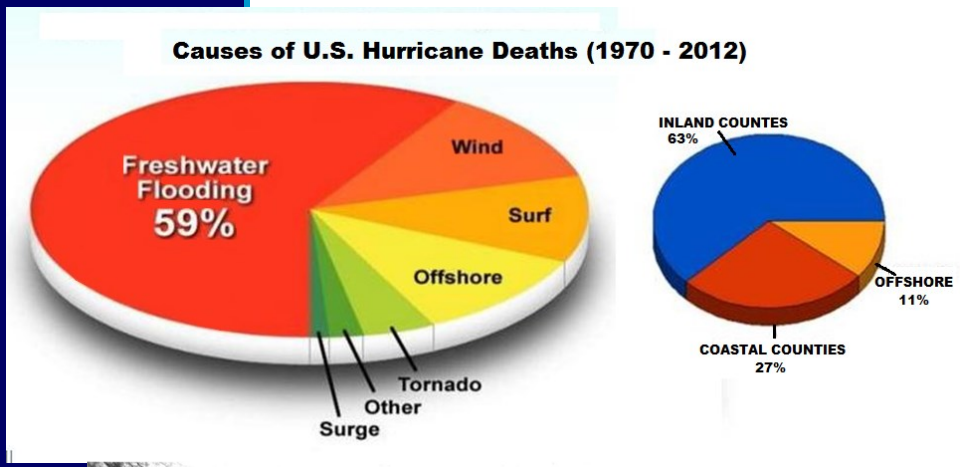
If you are swimming in the ocean and didn't see the rip from the beach or drifted into it without realizing, (continued on page 6)



Freshwater Flooding Still Top Cause of Tropical Cyclone Deaths

Tropical cyclones are notorious for their powerful wind and ocean overwash that cause major structural damage along the coast. Indeed, the wind speed and damage that can result is typically the foremost concern that comes to mind when landfalling tropical cylcones threaten inland areas of North Carolina. Statistics since 1970, however, reveal that well over half (59%) of the deaths attributed to tropical cyclones were caused by inland freshwater flooding.

Looking at the recent past on a national scale, there have been 4 tropical cyclones since 2010 that caused over one billion dollars worth of damage - hurricane Irene and tropical storm Lee in 2011, and hurricanes Isaac and Sandy in 2012. Going back just a bit further, there were three billion dollar hurricanes in 2008 -Dolly in July, Gustav in August, and Ike in September.



Flooding in Fayetteville, NC 1945

(Fayetteville Observer Bill Beltch Collection)

A recent National Weather Service (NWS) project sought to collect information on the top 5 historical flood events for each of the states. To try and get a balanced perspective from across North Carolina, the NWS office in Raleigh researched flood events for central and western NC, while NWS coastal offices in Newport and Wilmington looked at flood events nearer the coast. We tried to account for both the number of deaths and damage (adjusted to 2014 dollars). Research was limited in the pre-Civil War era due to lack of credible and detailed sources. Not particularly surprising, each of the selected top 5 flood events resulted from landfalling tropical cyclones.

A state-by-state breakdown of the historical events may be found here.
Many of these summaries contain photos and riveting eye witness accounts. A particularly interesting account from NC may be found here.

As you might expect, hurricane Floyd (1999) remains the benchmark in recent coastal NC flood history, with 35 deaths in NC (56 nationally) and 17,000 homes rendered uninhabitable. The total damage estimate ranges as high as 6 billion dollars.

(continued on page 8)

Flooding of Tarboro During Hurricane Floyd (1999)

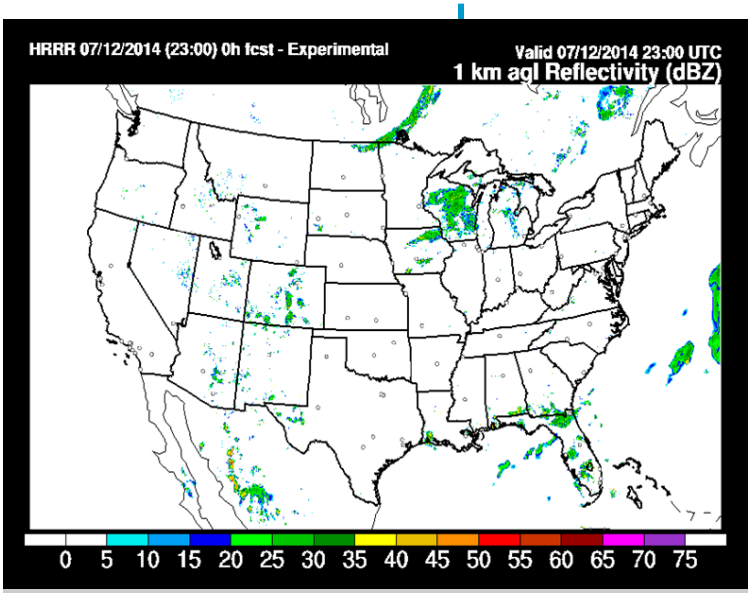
NWS Raleigh Issues New Recreational Lake Forecast

Many people regularly use the lakes across central NC for fishing, boating, swimming, and other uses. The Raleigh forecast office has recently begun issuing twice-daily forecasts specifically tailored for our area lakes. This forecast, called the "Recreational Forecast for Central NC Lakes," is issued each day at 4:50 am and pm, and is based on our regular public forecast. The morning issuance gives a detailed forecast for today and tomorrow, plus an extended outlook. The afternoon issuance provides details for the following two days, plus the extended forecast. We currently provide forecasts for high and low temperatures, humidity, winds, coverage of precipitation and lightning. We plan to expand these weather parameters to include clouds, more detailed winds and temperatures, as well as water temperature where available. Note that this product is currently not updated between issuance times, although this may change. This new lake forecast can be found here, or on our webpage, http://www.weather.gov/raleigh. Click on the "Text Bulletins" icon (in the middle of the page, under the map), and look for "RECRAH – Recreational Lake Forecast". If you are a frequent visitor to our lakes, you may wish to bookmark this page.

-Gail Hartfield

NWS Raleigh Conducts Aviation Weather Workshops

One of the most important parts of our jobs as meteorologists is connecting with our customers and fostering relationships that allow us to serve them better, which helps to create a more weather ready nation. With this in mind, NWS Raleigh hosted three aviation focus groups this past year. In all, close to 75 general aviation pilots visited the office and provided valuable feedback for our forecasters that will help improve forecasts. In addition, we were able to demonstrate all of the services we provide for pilots in central North Carolina as well as the services that the National Weather Service provides to pilots across the country. Numerous aviators were excited to learn about simulated reflectivity, a relatively new product that is available both here locally and nationwide (see image). Simulated reflectivity is numerical model output that gives the pilots an idea of what the observed radar MAY look like at a certain time, which aids with flight planning. While the simulated reflectivity is rarely correct in pinpointing the exact time and location a thunderstorm will occur, it does give an idea of the confidence that thunderstorms will occur in a certain region or time range, and how widespread they will be in coverage. They can also depict the mode of convection very well, which is to say whether storms will be scattered and unorganized, organized into multicellular clusters or lines, or even super-cellular in nature. Not only do these aviation workshops help aid pilots by showing what the National Weather Service has to offer, but they also serve as a sounding board where the pilots can express their needs to forecasters in order to improve NWS products, which is why we now plan to host workshops on a bi-annual basis.



Example of Model Simulated Reflectivy

–Katie Dedeaux

Hurricane Preparedness and Safety

"It is a good idea to prepare a family emergency plan, if you haven't done so already, to ensure you and your loved ones are as prepared as possible for when disaster strikes."

Hurricane season 2014 is in full swing. One hurricane (Arthur) has already made landfall in NC and three months still remain in the Atlantic hurricane season, including the peak month of September. It is a good idea to prepare a family emergency plan, if you haven't done so already, to ensure you and your loved ones are as prepared as possible for when disaster strikes. Here we will review some important terminology and hurricane safety information to help you get started.

First, some definitions: Hurricane Watch – issued when hurricane conditions (winds of 74 mph or greater) are possible within the area. This product is typically issued 48 hours in advance of the onset of the hurricane conditions. Tropical Storm Watch – issued when tropical storm conditions (winds of 39 to 73 mph) are possible within the watch area within 48 hours. Hurricane Warning – issued when hurricane conditions are expected within the warning area. This product is issued 36 hours in advance of the onset of the tropical-storm-force winds. Tropical Storm Warning – issued when tropical storm conditions are expected within the warning area within 36 hours. Extreme Wind Warning – issued when extreme sustained winds of a major hurricane (winds of 115 mph or greater) are expected within the hour.

Although wind speeds are used to determine the intensity of a hurricane (Saffir-Simpson Hurricane Wind Scale) there are many other weather hazards associated with tropical cyclones that are important to be aware of. These hazards include: Storm surge/tide (greatest coastal threat), tornadoes (typically found in the storm's rainbands), heavy rainfall/flooding (greatest inland threat), rip currents, and, of course, winds. So, what can we do to prepare for these dangers? Well, before there is an immediate threat of a tropical cyclone impacting the area, you should take the following actions: Determine safe evacuation routes, learn locations of official shelters, inspect emergency equipment (flashlights, generators, NOAA Weather Radio, etc.), purchase a supply of non-perishable food and

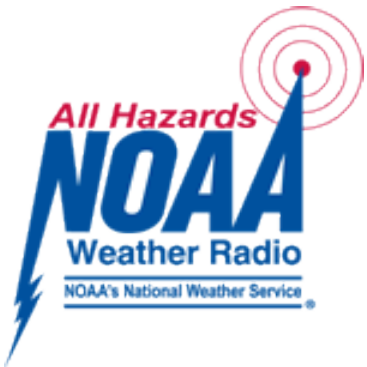
An Emergency Supply Kit Should Include:

- **At least a 3-day supply of water (one gallon per person, per day)**
- **At least a 3-day supply of non-perishable food**
- **At least, one change of clothing and shoes per person**
- **One blanket or sleeping bag per person**
- **First-aid kit**
- **Battery-powered NWR and a portable radio**
- **Emergency tools**
- **Flashlight, extra batteries**
- **Extra set of car keys**
- **Credit card and cash**
- **Special items for infant, elderly or disabled family members**
- **Prescription and non-prescription medicines**

What to Bring to a Shelter:

- **First-aid kit**
- **Medicine, prescription**
- **Baby food and diapers**
- **Games, books, music players with headphone**
- **Toiletries**
- **Battery-powered radio and cell phone**
- **Flashlight**
- **Extra batteries**
- **A blanket or sleeping bag for each person**
- **Identification**
- **Copies of key papers such as insurance policies**
- **Cash, credit card**

drinking water, have plywood or other home protection material on hand, clear gutters and downspouts, review your insurance policy, and keep pets in mind when searching for hotels along your evacuation route. During the storm, if you are in a watch area, be sure to listen to the radio, TV, NOAA Weather Radio, or however you receive weather updates to stay updated on the storms progress. Make sure you have your vehicles fueled up, have extra cash on hand, prepare your home (cover windows, doors, etc.), check your emergency kit (batteries, food, water, first aid supplies, and medications), and if possible bring in or secure outdoor objects that may get blown around. If you are in a warning area, closely monitor the weather for official bulletins, if you are told to evacuate, you should do so immediately (you may also want to evacuate if you live in a mobile home, live along the coast, or live in a high-rise building), and don't forget about your pets (most shelters do not allow them so be sure to find pet-friendly establishments along the way. If you plan to stay home, turn refrigerator to maximum cold and keep it closed, turn off utilities if told to do so by authorities, turn off propane tanks, unplug small appliances, and fill the bathtub and large containers with water in case clean tap water is unavailable (use for cleaning and flushing only, do not drink it). Be prepared to take action should winds become severe or a tornado occur.



After the storm has passed, continue to monitor the weather, as some threats may linger after the storm has moved away. Wait until an area is declared safe before returning/ entering. Watch for closed roads, and never try to drive around a barricade or on a flooded road. Avoid weakened bridges and washed out roads. Watch out for downed powerlines and other hazards. Never use a generator indoors and be sure to check gas, water and electrical units for damage. Use a flashlight to inspect damage, not an open flame. Do not drink or prepare food with tap water until officials say it is safe to do so.

Once you come up with a family emergency plan, be sure to practice and maintain it! Ensure your family knows meeting places, phone numbers and safety rules. Conduct drills. Test your smoke detectors and NOAA Weather Radio monthly and change the batteries at least once each year. Test and recharge your fire extinguisher(s) according to the manufacturer's instructions. Last but not least, replace stored water and food every six months.

This information was taken from the pamphlet "Tropical Cyclones – A preparedness Guide" which can be found here.

-Kathleen Pelczynski

NOAA Predicts Slow to Average Hurricane Season

"The 2014 hurricane season began on June 1st, and NOAA's Climate Prediction Center is predicting near normal or below normal activity for the Atlantic Basin..."

The 2014 hurricane season began on June 1st, and NOAA's Climate Prediction Center is predicting near normal or below normal activity for the Atlantic Basin (in the coming months), which consists of the North Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. According to the official seasonal outlook, this prediction includes a 70 percent likelihood of 8 to 13 total named storms, which have winds of 39 mph or higher. Of the named storms, 3 to 6 could become hurricanes, with 1 to 2 major hurricanes (Category 3 or higher). The seasonal average is 12 named storms, with 6 hurricanes and 3 major hurricanes.

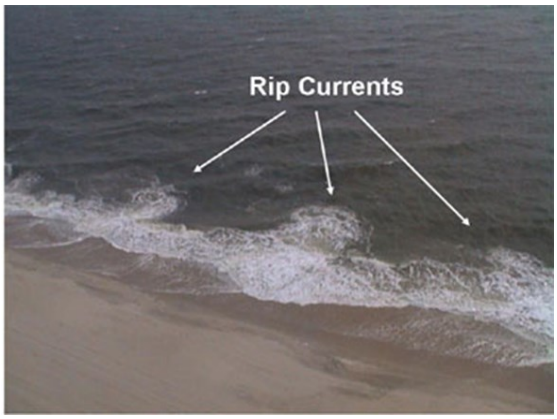
So why is the forecast for a near or below normal tropical activity? The main reason is that an El Niño event is expected to develop this summer into the fall. El Niño is part of the El Nino Southern Oscillation, when upwelling over the eastern Pacific weakens and ocean temperatures become unusually warm. The effects of the warmer eastern Pacific waters are to increase wind shear over the Atlantic, which has a strong tendency to limit tropical cyclone development. As El Niño strengthens, conditions will become less favorable for development and intensification. However, it is important to remember that it only takes one landfalling storm to cause a disaster. To help with preparation for the hurricane season, May 25-31 was Hurricane Preparedness Week. Each day a different topic was covered, ranging from wind and storm surge, to the forecast process and when to take action. Even though Hurricane Preparedness Week has passed, it is never too late to prepare. For more information, please visit http://www.nhc.noaa.gov/prepare/.

-Barrett Smith

Source: NOAA

Know Before You Go: Rip Currents (from page 1)

which is easy to do, there is a standard procedure to help you "break the grip of the rip." The first thing people tend to do when they realize they are being pulled out to sea is to panic. First and foremost, don't panic! Second thing people tend to do is to try to swim directly back to shore and just end up fighting the current. Don't fight the current because it is strong and you will just use up the energy needed to make it back to shore after getting out of the rip current. Instead of swimming against the current, pick a direction parallel to the beach (doesn't matter which one) and swim. This will cause you to be perpendicular to the rip current and allow you to eventually get out of it. It is important to remember that while you are swimming out of the rip it will still continue to pull you out to sea. That is normal and eventually will subside once you have successfully gotten out of the rip current. At this point you can turn towards the shore and swim safely towards the beach.



It is always best to know the ocean conditions before heading down to the beach. Our offices in Newport, NC and Wilmington, NC put out a beach forecast containing information about surf heights, tides, rip currents, and lightning risk, among other variables. To access the beach forecast from the Wilmington office, which covers from north of Surf City, NC to Georgetown, SC, click here. To access the beach forecast from the Newport, NC which covers the Outer Banks to Surf City, NC please click here.

-Ryan Ellis

New Radar Scanning Strategy Could Lead to Improved Warnings

A new software upgrade was installed at the National Weather Service (NWS) Raleigh Doppler radar (WSR-88D) in early July that is expected to have a significant impact in severe weather operations. The software change will allow the WSR-88D radar to obtain the lowest level radar scan more frequently during severe weather events.

Previously, the WSR-88D scanned the atmosphere at progressively higher angles to create a 3D profile of a storm. These scans would begin at 0.5 degrees above the horizon (the lowest angle possible) and end at a maximum angle of 19.5 degrees. These individual scans are combined to produce what is called a volume scan. Last year, a feature called AVSET (Automatic Volume Scan Elevation Termination) was installed that allows the radar to automatically restart a volume scan when the radar beam is scanning above all of the storms on radar. With the latest upgrade installed in early July, a new feature called SAILS (Supplemental Adaptive Intra-Volume Low-Level Scan) will enable the radar to insert an additional 0.5 degree scan in the middle of a volume scan. See the illustration above for more details.

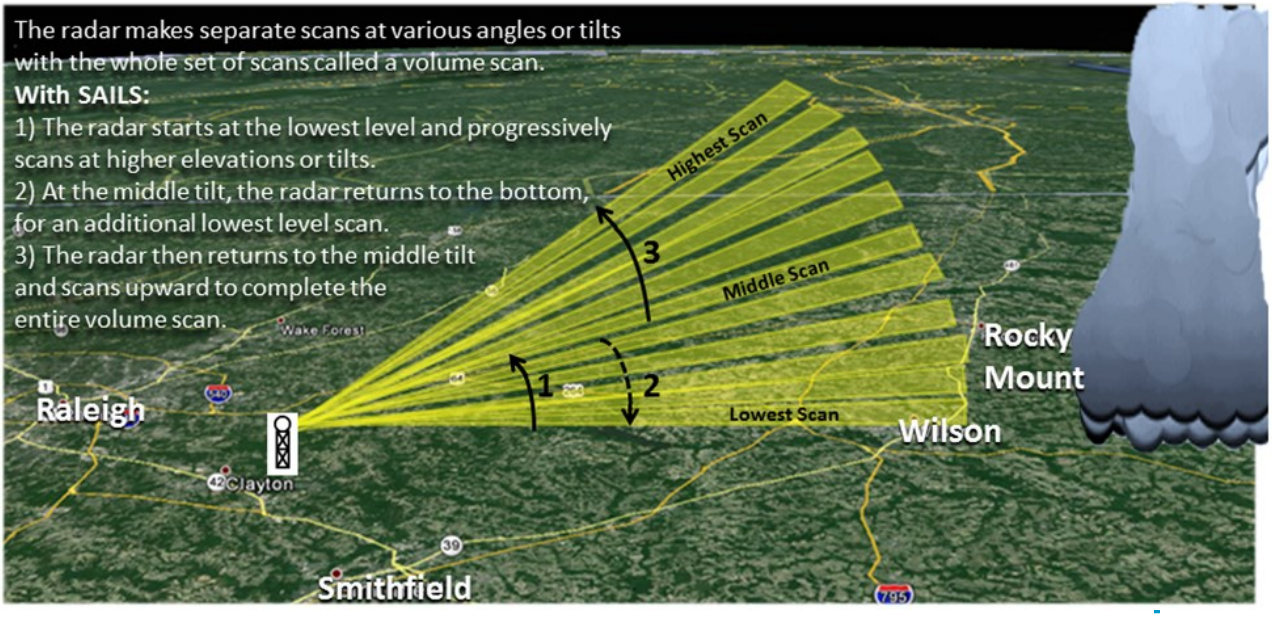
When it comes to severe weather, frequent low-level radar scans are crucial to identifying and providing warnings for the development of severe weather including tornadoes. Currently, the WSR-88D radar completes its lowest scan in 3 to 4.3 minutes (during severe weather), depending on the range of the storms from the radar. With SAILS, the radar can now perform this low-level scan every 1.9 to 2.5 minutes, obtaining a 0.5 degree scan almost twice as frequently as before and providing NWS meteorologists with the ability to observe rapidly changing weather phenomenon more frequently and issue more timely severe weather warnings.

-Jonathan Blaes

SAILS - Supplemental Adaptive Intra-Volume Low-Level Scan

A New Way to Scan the Skies!

It is crucial for meteorologists to observe the lowest portions of thunderstorms when severe weather threatens. More frequent scans of the lowest radar tilt will allow NWS meteorologists to observe rapidly changing weather phenomenon and issue more timely severe weather warnings. Currently, the WSR-88D provides its lowest level scan every 3-5 minutes during severe weather. **With SAILS, the radar will perform this critical low-level scan every 1.5-2.5 minutes!**



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Tropical Flood (from page 2)

Flooding in Fayetteville, NC 1945 (Fayetteville Observer Bill Beltch Collection)

Catastrophic flooding is rare in central NC, especially since the mid 20th century with the impoundment and subsequent regulation of piedmont rivers (the Neuse and Cape Fear). A 1945 hurricane dubbed the "Homestead Hurricane," due to its point of landfall in Homestead, FL, produced massive flooding on rivers in central NC, and many of the historical crests from that storm remain records today.

-Michael Moneypenny

NWS Raleigh's Newest Senior Forecaster

Barrett Smith

In April, NWS Raleigh forecaster Barrett Smith was selected as the newest Senior Forecaster at WFO Raleigh. During his time at WFO Raleigh, Barrett has served the WFO and its customers well in many significant weather events, and has also been a leader in and contributor to numerous programs. Among those programs, Barrett has led and contributed to science through principal investigator efforts in the Collaborative Science, Technology, and Applied Research Program (CSTAR), along with development of a Weather Research and Forecasting (WRF) model used locally at the office. Barrett has also contributed to the NWS Raleigh outreach program through a variety of customer service efforts inside and outside of the office, as well as to the observation program through station inspections.

Further showing a wide range of skills, Barrett has contributed to the NWS Raleigh hydrology program through various surveys of river and flood prone sites, along with partner training of NWS Raleigh hydrology tools and services. Barrett has led office involvement in community service efforts through promotion of those efforts, and his direct participation in them. Originally from Randolph County, Barrett attended North Carolina State University, receiving a Bachelor's Degree in Meteorology in August, 2005 and graduating with a Master's Degree in December, 2007.

Barrett started his career with the NWS as part of the Student Career Employment Program in October, 2006. He was hired as a full-time meteorologist intern in January, 2008 and was promoted to a general forecaster position in January, 2010. Barrett is a member of the information technology committee of the National Weather Association, and he and his wife reside in the Raleigh area.

-Darin Figurskey